RAGA PERFORMANCE TIME AND THE GRAMA-MURCCHANA SYSTEM

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The idea that one might associate various melodic types with particular times of the day for their proper performance, there being the feeling that the musical modes evoke certain feelings or moods which are most compatible with only certain times of the day or night, is surely one of the most striking features of North Indian classical music. It is odd that so unusual a feature of this system of music has not been adequately studied (Deva 1967:140). Although the association is a very old one, mentioned first by Matanga in the 8th Century, most of what we have available as a theory of associating ragas with times of day is a few fragmentary and *ad hoc* rules (Das 1951: 69-82).

As Deva has pointed out, most of these rules involve considerations of either scale, position of *vadi swara* (the principle note of the raga), or the raga's tonal movement (op. cit., 137). Limiting our consideration solely to questions of *grama-murcchana* related scale-types, the problem can be approached from two levels: a chromatic perspective, and a transilient perspective.

1. The chromatic perspective

Consider the fact that all of the twelve most consistent of the possible chromatic scales (which are available as *murcchanas* of the chromatic *Ma-grama*)[1] can be arranged in orderly fashion falling within the limits set by the following two chromatic scales: one having all notes at the *lower* of the two *shruti* positions, and the other having all notes at the *higher* of the two *shruti* positions. (Sa, of course, has only one position). The first is the set of positions belonging to the cycle of fourths and is the Sa *murcchana* of the *Ma-grama* chromatic scale, the second is the set of positions belonging to the cycle of fifths and is equal to the Pa^3 *murcchana* of the *Ma-grama* chromatic scale. This series of orderly changes in *shruti* value of the notes of the chromatic scale and its aesthetic significance is indicated in the following table.

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[1] *The discussion which follows in this paper presupposes an familiarity with the grama-murcchana system as discussed in the author's paper, "A Mathematical Model of the Shruti-Swara Grama-Murcchana Jati System." (see p. 36 for reference). The reader is advised to consult that paper before he reads this present one.*

PROGRESSIVE MAJORIZATION OF THE SHRUTIS OF THE CHROMATIC SCALE

OF THE CHROMATIC SCALE

step	Ma-grama chromatic murcchana starting from:	S	R̲	R	G̲	G	M̲	Ṁ	P	D̲	D	N̲	N	aesthetic value
		resulting chromatic scale												
1.	Sa	°	–	–	–	–	–	–	–	–	–	–	–	darker
2.	Ma^1	°	–	–	–	–	–	–	+	–	–	–	–	.
3.	Ni^1	°	–	+	–	–	–	–	+	–	–	–	–	.
4.	Ga^1	°	–	+	–	–	–	–	+	–	+	–	–	.
5.	Dha^1	°	–	+	–	+	–	–	+	–	+	–	–	.
6.	Re^1	°	–	+	–	+	–	–	+	–	+	–	+	.
7.	Ma^3	°	–	+	–	+	–	+	+	–	+	–	+	.
8.	Ni^3	°	+	+	–	+	–	+	+	–	+	–	+	.
9.	Ga^3	°	+	+	–	+	–	+	+	+	+	–	+	.
10.	Dha^3	°	+	+	+	+	–	+	+	+	+	–	+	.
11.	Re^3	°	+	+	+	+	–	+	+	+	+	+	+	.
12.	Pa^3	°	+	+	+	+	+	+	+	+	+	+	+	brighter

— = lower shruti position
+ = higher shruti position

Notice that up to and including the seventh step, the increase affects only *tivra* (major) notes, and that beyond this step, the increase affects only *komal* (minor) notes.

The chromatic scale of the seventh *murcchana* of this series is the most 'active' scale in the set. It has all of its *komal swaras* in their *atikomal* (most minor) positions, while, at the same time, all its *tivra swaras* in their *tivratar* (most major) positions. *All of the shrutis in this particular scale belong to the Pythagorean families* (Arnold 1984: 32 ff). The Pythagorean *shruti* positions lie at the extreme limits of the tonal space of the *swara* degree, and mostly their ratios are more complex than the ratios describing the positions of the harmonic family *shrutis*. These higher ratios imply higher tensions of mixture, and hence, aesthetically greater severity.

It is curious that both *tivra* and *komal swaras* should find their most severe expression in the same chromatic scale. The 'cool' notes, the *komals,* are at their 'coldest' precisely when the 'warm' notes, the *tivras,* are at their 'hottest'. This chromatic scale is a transitional scale having a high degree of instability, or a high degree of stress. This kind of transition through an aesthetic tension in the scales should be compared to the transition periods of activity in the 24-hour cycle of the day which occur at sunrise and sunset.

"As evening *sandhiprakasa* (sunset) may be said to represent the hottest part of the night, from which point on, the night becomes cooler, so morning *sandhiprakasa* (dawn) may be said to represent the coolest part of the morning, from which point on, it becomes warmer. Analogously, the sixth and seventh steps contain both the hottest of the majors, which by degrees 'cool' moving from step six or seven backwards (to step one), and also the coldest of the minors, which progressively 'warm' from step seven forwards."

"Thus, we should expect that ragas of the night will evolve from scales that, as the night goes on, are born of the chromatic *murcchanas* progressively nearing step one. And, so too, we should expect that the ragas of the morning will evolve out of scales that, as the morning develops, are born out of the scales of the *murcchanas* progressing towards the twelfth step." (Arnold 1974: 26-27) This relation is expressed graphically in the diagram on page 37.

2. The transilient scale perspective

To consider the question of time from the point of view of seven to nine note (transilient) scales, it it necessary to refer to the table of scales of the extended *grama-murcchana* series (below). This table indicates the natural affinity between notes of the chromatic *Ma-grama* scale, and certain particular scale-types whose structure is related to the structure of the *gramas.*

It is necessary to note some technical points which the casual reader may prefer to skip, the first time through, going directly to the diagram on page 38 which summarizes the relation between time and the *grama* related scales.

The series of scales summarized in the "extended *grama-murcchana* series" (Arnold 1983: 38) is repetitive. Complete in twelve steps, the thirteenth step starts another round but the pitch of the Sa will not be the same in the second round as in the first. Instead, the Sa of the second round will be a comma higher. (Notice that this is equivalent to *lowering* the Sa of the *grama* by a comma. This is known technically as *sadjasadharana,* and it makes use of the *cyuta* (fallen) Sa. (cf. *Sangitaratnakara* 5,7-9).

SCALES OF THE EXTENDED GRAMA-MURCCHANA SERIES

step	Ma-grama chromatic murcchana starting from:	(1) śuddha grama	(2) vikrit grama (antara)	(3) vikrit grama (antara kakali)	adding to grama	dropping from grama
1.	Sa	kaphi	khamaj	bilaval	--	--
2.	Ma^1	khamaj	bilaval	kalyan	--	--
3.	Ni^1	bilaval	kalyan	marva	3: N^1	S
4.	Ga^1	kalyan	marva	purvi	2: G^1 3: G^1 N^1	2: M^1 3: M^1 S
5.	Dha^1	marva	purvi	todi	1: D^1 2: D^1 G^1 3: D^1 G^1	1: N^1 2: N^1 M^1 3: S M^1
6.	Re^1	purvi	todi	--	1: R^1 D^1 2: R^1 D^1	1: G^1 N^1 2: G^1 N^1
7.	Ma^3	todi	--	a. lalit b. bhairao	1: M^3 R^1 3a: M^3 3b: M^3 R^1	1: N^1 G^1 3a: D^3 G^1 3b: D^3 S
8.	Ni^3	--	--	a. lalit b. bhairao c. bhairavi	3a: G^1 N^1 3b: G^1 M^3 3c: M^3	3a: R^3 D^3 3b: R^3 M^1 D^3 3c: M^1
9.	Ga^3	--	komal pancam§	a. todi b. bhairavi	3a: -- 3b: --	3a: D^3 R^3 3b: --
10.	Dha^3	komal p.	bhairavi	asavari	--	--
11.	Re^3	bhairavi	asavari	kaphi	--	--
12.	Pa^3	asavari	kaphi	khamaj	--	--

§ We call this scale "*komal pancam*" (equivalent to B-mode) because its distinguishing characteristic is that its Pa (Sol) has shifted to the diminished, or *komal* position. There is no common name for this scale in Hindustani music tradition.

Following the order of the series, which each time takes the next *murcchana* starting from a perfect fourth above the starting place of the previous *murcchana*, the step from 12 to 13 involves going from Pa^3 *murcchana* to *cyuta*-Sa *murcchana*. This has the effect of raising the Sa of the resultant scale from the base Sa of step 1 by a comma. This error can be eliminated by making a *sadharana* from *cyuta*-Sa back to the original Sa. Because the phenomenon of musical sound has the nature of a spiral, not a circle, it is necessary to make this correction to allow the round to start.

It is necessary to have the freedom to consider the cyclical nature of the scale-types, which nevertheless, acoustically represent not a circle but a spiral, because to approach the problem of time in relation to the main sequence of scale-types, one requires the liberty to start the sequence from the seventh step and pass from step one to twelve, or *vice versa*.

Following the same principle as in the chromatic perspective, namely, that the seventh step *murcchana* (which is also the most active scale-type) should be taken as the starting place for sunset and sunrise, in the evening one starts at step seven and works backwards into the night to step one, and at the dawn, one starts from step seven and works forward to step twelve as the day advances.

However, to complete the natural movement like this through related scale-types, after midnight and into the deep night, or after noon, into the late afternoon, it is necessary to be able to pass from step one to twelve or *vice versa* directly. From the point of view of the chromatic perspective, this step is ruled out. Nevertheless, if for the moment, the question of *shruti* positions of the *swaras* is held in abeyance, one can see the obvious continuum: *khamaj-kaphi-asavari-bhairavi,* having 2,3,4, and 5 *komal* (minor) *swaras* respectively. The step from *kaphi* to *asavari,* if it is to be made as a regular transformation of scale-types and mood following the time of day, must not suddenly shift the *shruti* families of its notes, as the step one to twelve (Sa to Pa^3 *murcchana* of the *gramas*) ordinarily would do.

Therefore, it must be recognized that there are two impulses at work. One is the continuum of change of the chromatic scales which underlie all lesser-note scales, and the other is the continuum of change of scale-type of the *grama*-related scales. It is necessary to be able to follow both continua at once in the cases mentioned above, namely, after mnidight and after midday.

To do this requires tuning some scale-types belonging to the *grama-murcchana* series according to the underlying scheme of a chromatic *murcchana* which starts from a different *swara* than does the *murcchana* which properly gives the desired resulting scale-type. Thus, for example, according to the *grama* perspective, around 11:00 P.M. one should perform ragas in the *kaphi* scale (D-mode) and after midnight that should change to *asavari* (A-mode) scale ragas. But note that the former, available from the Sa *murcchana* of the *gramas* has all of its notes at the lower of the *shruti* positions, while the latter, available from Pa^3 *murcchana,* has all of the notes at the higher positions. Such a tuning for *asavari thaat* is suitable for the day, but hardly is such a bright tuning for it welcome for the late night.

The solution is to follow the *grama-murcchana* transformation series to determine scale-type following time of day, but to follow the Ma-*grama* chromatic transformation series to determine the shruti positions of the *swaras* (i.e. the tuning) of the resulting scale-types. This is summarized in the diagram on page 38.

3. Time, murcchana, and raga-tuning

Following the implications of the above theory, the table on pages

39-41 summarizes for about seventy-five ragas, their performance times, to which *grama-murcchana* they belong, and the microtonal tuning of their scales according to the *grama-murcchana* theory. It is interesting how many of these implications do conform to the tradition.

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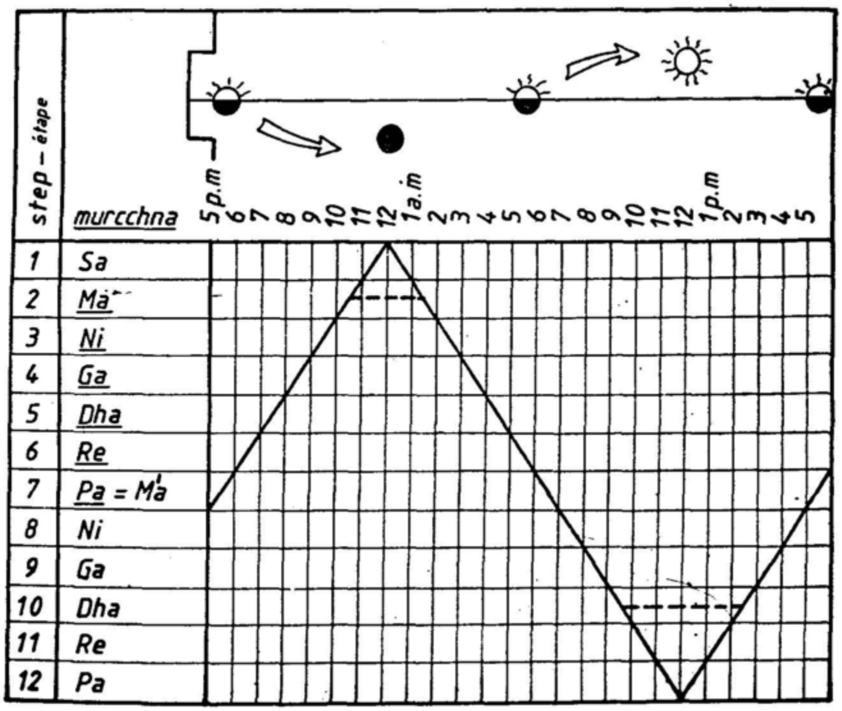
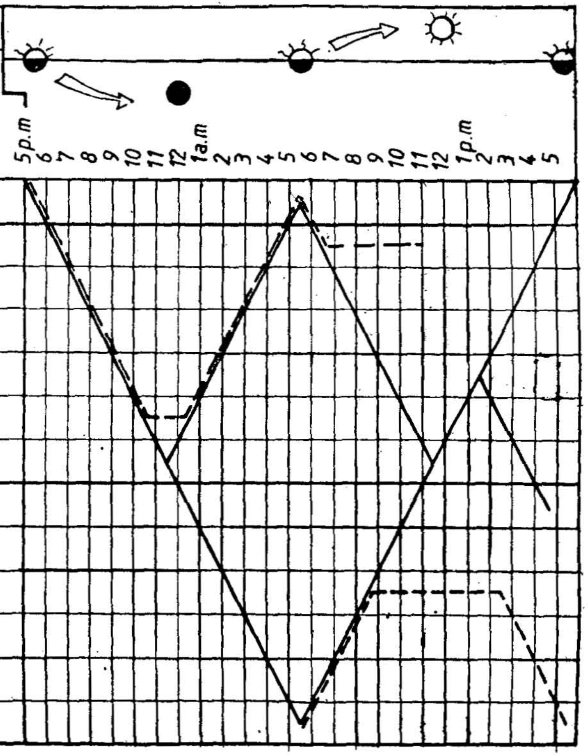
TIME AND MURCCHNA CHANGE : THE CHROMATIC PERSPECTIVE



N.B. Since both scales at stepl and step 12 lack either a perfect fifth (Sa/Pa) or a perfect fourth (Sa/Ma), they cannot be used in practice in the presence of a Sa drone : hence the dotted line.

TIME AND MURCCHNA CHANGE THE GRAMA PERSPECTIVE

step – étape	Ma-grama chromatic murcchna starting from: à partir de	"Main sequence" scales – Séquence principale		
		shuddh grama	vikrit grama (antara)	vikrit grama (antara-kakali)
7	Ma'	Todi	——	(Purvi) (Marva)
6	Re	Purvi	Todi	——
5	Dha	Marva	Purvi	Todi
4	Ga	Kalyan	Marva	Purvi
3	Ni	Bilaval	Kalyan	Marva
2	Ma	Khamaj	Bilaval	Kalyan
1	Sa	Kaphi	Khamaj	Bilaval
12	Pa	Asavari	Kaphi	Khamaj
11	Re	Bhairavi	Asavari	Kaphi
10	Dha	Komal-pancam (*)	Bhairavi	Asavari
9	Ga	——		Todi Bhairavi
8	Ni	——	——	Lalit Bhairav
7	Ma	Todi	——	Lalit Bhairav



Key : Solid line indicates the transilient scale series; broken lines indicate the chromatic scale series.

TIME, MURCCHANA, AND RAGA TUNING

time	step	grama murcchana from:	resulting grama scale type	Ma-grama chromatic murcchana from:	ragas in scale
P. M. 5 - 6	7.	Ma^3	$S\ R^{1(2)*}G^1\ G^4\ M^1\ M^4\ P^4\ D^1\ D^4\ N^4$ todi/purvi/marva	Ma^3	Purvi Triveni
6 - 7	6.	Re^1	$S\ R^1\ G^1\ G^4\ M^{3(4)*}P^4\ D^1\ D^4\ N^1\ N^4$ purvi/todi/marva	Re^1	Shri Puriyadhanashri Maligaura
7 - 8	5.	Dha^1	$S\ R^1\ G^1\ G^4\ M^3\ P^4\ D^1\ D^4\ N^{3\ (4)*}$ marva/purvi/todi	Dha^1	Jetashri Marva Jait
8 - 9	4.	Ga^1	$S\ R^{1*}\ R^{4*}\ G^{3*\ (4)}\ M^3\ P^4\ D^1\ D^4\ N^3$ kalyan/marva/purvi	Ga^1	Puriya Kalyan Shyam-kalyan Puriya-kalyan
9 - 10	3.	Ni^1	$S\ R^1\ R^4\ G^3\ M^1\ M^3\ P^4\ D^{3\ (4)}\ N^3$ bilaval/kalyan/marva	Ni^1	Bhupali Kamod Chayanat Hamir Durga
10 - 11	2.	Ma^1	$S\ R^{3\ (4)}\ G^3\ M^1\ M^3\ P^4\ D^3\ N^1\ N^3$ khamaj/bilaval/kalyan	Ma^1	Kedar Tilang Tilak-kamod Desh Jhinjhoti Khamaj Rageshri
11 - 12	1.	Sa	$S\ R^{3\ (4)}\ G^1\ G^3\ M^1\ P^4\ D^3\ N^1\ N^3$ kaphi/khamaj/bilaval	Ma^1	Jaijaivanti Kaphi Malgunji Bageshri Abhogi kanada Nayaki kanada
A. M. 12 - 1	12.	Pa^3	$S\ R^{3\ (4)}\ G^1\ G^3\ M^1\ P^4\ D^1\ D^3\ N^1$ asavari/kaphi/khamaj	Ma^1	Darbari kanada Adana kanada Barva Malkauns Bihag Samkara
	2.	Sa	$S\ R^{3\ (4)}\ G^3\ \overset{\text{or}}{M^1}\ M^3\ P^4\ D^3\ N^1\ N^3$ khamaj/bilaval/kalyan	Ma^1	
1 - 2	11.	Re^3	$S\ R^1\ R^4\ G^1\ M^1\ P^4\ D^1\ D^{3\ (4)}\ N^1$ bhairavi/asavari/kaphi	Ni^1	Malkauns Bairagi Bhattiyar Sohini Hindol-pancham
	3.	Ni^1	$S\ R^1\ R^4\ G^3\ M^1\ M^3\ P^4\ D^{3\ (4)}\ N^3$ bilaval/kalyan/marva	Ni^1	

*The number in parentheses indicates the alternative choice for the *pancham* of Sa *grama*. Otherwise the scale is given in terms of Ma *grama*.

TIME, MURCCHANA, AND RAGA TUNING

time (A. M.)	step	grama murcchana from:	resulting grama scale type	Ma-grama chromatic murcchana from:	ragas in scale
2 -3	10.	Dha^3	$S\ R^1\ R^4\ G^1\ M^1\ M^3\ P^4\ D^1\ N^1$ komal p./bhairavi/asavari	Ga^1	Bairagi Sampurn malkauns
	4.	Ga^1	$S\ R^1\ R^4\ G^3\ (4)\ M^3\ P^4\ D^1\ D^4\ N^3$ kalyan/marva/purvi	Ga^1	Paraj Sohini Vasant
3 - 4	9.	Ga^3	$S\ R^1\ G^1\ M^1\ M^3\ P^4\ D^1\ N^1\ N^3\ (4)$ --/--/todi	Dha^1	Kalangada Lalit
	5.	Dha^1	$S\ R^1\ G^1\ G^4\ M^3\ P^4\ D^1\ D^4\ N^3\ (4)$ marva/purvi/todi	Dha^1	Paraj
4 - 5	8.	Ni^3	$S\ R^1\ G^1\ G^4\ M^1\ M^3\ (4)\ P^4\ D^1\ N^1\ N^4$ --/--/ lalit (bhairao)	Re^1	Prabhat Lalit pancam
	6.	Re^1	$S\ R^1\ G^1\ G^3\ M^3\ (4)\ P^4\ D^1\ D^4\ N^1\ N^4$ purvi/todi/--	Re^1	Jogiya
5 - 6	7.	Ma^3	$S\ R^1\ (2)\ G^1\ G^4\ M^1\ M^4\ P^4\ D^1\ D^4\ N^4$ todi/lalit/bhairao	Ma^3	Bhairao Shivmat-bhairao Ahir-bhairao Vibhas (bhairao) Todi
6 - 7	8.	Ni^3	$S\ R^2\ G^1\ G^4\ M^1\ M^4\ P^4\ D^1\ (2)\ N^1\ N^4$ todi/lalit/bhairao	Ni^3	Vasant-mukhari Ramkali Ahir-bhairao
	6.	Re^1	$S\ R^1\ G^1\ G^3\ M^{3(4)}\ P^4\ D^1\ D^4\ N^1\ N^4$ purvi/todi/--	Re^1	Vibhas (purvi) Todi
7 - 8	9.	Ga^3	$S\ R^2\ G^1\ (2)\ M^1\ M^4\ P^4\ D^2\ N^1\ N^4$ --/--/todi-bhairavi	Ga^3	Gunkali Vilaskhani todi
	5.	Dha^1	$S\ R^1\ G^1\ G^4\ M^{3(4)}\ P^4\ D^1\ D^4\ N^4$ marva/purvi/todi	Re^1	Ananda-bhairao Bhattiyar Vibhas (marva)
8 - 9	10.	Dha^3	$S\ R^2\ R^4\ G^2\ M^1\ M^4\ P^4\ D^2\ N^1\ (2)$ --/bhairavi/asavari	Dha^3	Śuddha bhairavi Bhupal todi
	4.	Ga^1	$S\ R^1\ R^4\ G^4\ M^{3(4)}\ P^4\ D^1\ D^4\ N^4$ kalyan/marva/purvi	Re^1	Hindol Deshkar
9 - 10	11.	Re^3	$S\ R^2\ R^4\ G^2\ M^1\ (2)\ P^4\ D^2\ D^4\ N^2$ bhairavi/asavari/kaphi	Re^3	Komal asavari Bhairavi Gandhari
	3.	Ni^1	$S\ R^1\ R^4\ G^4\ M^1\ M^{3(4)}\ P^4\ D^4\ N^4$ bilaval/kalyan/marva	Re^1	Bilaval

TIME, MURCCHANA, AND RAGA TUNING

time	step	grama murcchana from:	resulting grama scale-type	Ma-grama chromatic murcchana from:	ragas in scale
A.M. 10 - 11	12.	Pa^3	$S\ R^4\ G^2\ G^4\ M^1\ P^4\ D^2\ D^4\ N^{1\ (2)}$ asavari/kaphi/khamaj	Dha^3	Asavari Devgandhar Deši
	2.	Ma^1	$S\ R^4\ G^3\ M^1\ M^{3(4)}\ P^4\ D^4\ N^1\ N^4$ khamaj/bilaval/kalyan	Re^1	Bilaval
11 - 12	1.	Sa	$S\ R^4\ G^2\ G^4\ M^1\ P^4\ D^4\ N^{1\ (2)}\ N^4$ kaphi/khamaj/bilaval	Dha^3	Deshi. Suha Sugharai Bilaval
P. M. 12 - 1	2.	Ma^1	$S\ R^4\ G^4\ M^1\ M^4\ P^4\ D^4\ N^{1\ (2)}\ N^4$ kamaj/bilaval/kalyan	Dha^3	Bilaval Madhyamad sarang Brindavani sarang
1 - 2	3.	Ni^1	$S\ R^2\ R^4\ G^4\ M^1\ P^4\ D^4\ N^4$ bilaval/kalyan/marva	Dha^3	Suddha sarang Gaud sarang
2 - 3	2.	MA^1	$S\ R^4\ G^4\ M^1\ M^4\ P^4\ D^4\ N^{1\ (2)}\ N^4$ khamaj/bilaval/kalyan	Dha^3	Śuddha sarang Gaud sarang
	4.	Ga^1	$S\ R^2\ R^4\ G^4\ M^4\ P^4\ D^2\ D^4\ N^4$ kalyan/marva/puriya	Dha^3	Brindavani sarang --
3 - 4	1.	Sa	$S\ R^4\ G^{1(2)}\ G^4\ M^1\ P^4\ D^4\ N^2\ N^4$ kaphi/khamaj/bilaval	Ga^3	Bhimpalasi Dhanashri Madhuvanti
	5.	Dha^1	$S\ R^2\ G^{1\ (2)}\ G^4\ M^4\ P^4\ D^2\ D^4\ N^4$ marva/purvi/todi	Ga^3	Patmanjari Multani
4 - 5	1.	Sa	$S\ R^4\ G^{1\ (2)}\ G^4\ M^1\ P^4\ D^4\ N^2\ N^4$ kaphi/khamaj/bilaval	Ga^3	Bhimpalasi Patadip Madhuvanti
	6.	Re^1	$S\ R^2\ G^1\ G^4\ M^4\ P^4\ D^{1\ (2)}\ N^1\ N^4$ purvi/todi/—	Ni^3	Multani